CHAPLYGINA, Z.A.; ZHILYAYEVA, R.V.; TEODOROVICH, V.P.

Immunogenesis in experimantal animals following the introduction of polyvinol, a blood-substituting solution. Zhur. mikrobiol., epid. i imm. 41 no. 2:142-143 F '64.   (MIRA 17:9)

1. Leningradskiy institut perelivaniya krovi.

CHAPLYUK, M.I., aspirant; LAVROVA, I.G., assistent

Study of morbidity with temporary loss of working capacity. Sov.
zdrav. 15 no.3:22-26 My-Je '56.   (MLRA 9:8)

1. Iz kafedry organizatsii zdravookhraneniya (zav. - dotsent S.V.
Kurashov) I Moskovskogo ordena Lenina meditsinskogo instituta.
        (VITAL STATISTICS,
            morbidity with temporary loss of working capacity (Rus))
        (WORKING,
            capacity loss in morbidity statist. (Rus))

CHAPLYUK, M.I.; BASSALYK, D.A.

All-Russian conference of directors of higher medical schools,
institutes of post-graduate medical training, and research institutes.
Zdrav. Ros. Feder. 4 no.8:35-38 Ag '60.   (MIRA 13:9)
                    (MEDICINE—STUDY AND TEACHING)

CHAPLYUK, M.I. (Moskva)

Incidence disease among workers of the aniline dye industry. Zdrav.
Ros. Feder. 4 no. 10:23-26 O '60.   (MIRA 13:10)
        (CHEMICAL WORKERS—DISEASES AND HYGIENE)
            (COAL-TAR PRODUCTS—TOXICOLOGY)

CHAPLYUK, M.I.; BASSALYK, D.A.

All-Russian conference of directors of advanced medical schools, post-graduate medical institutes and research institutes. Sov.med. 25 no.8:148-150 Ag '60.   (MIRA 13:9)
                          (MEDICINE—CONGRESSES)

CHAPNIK, I.M

USSR/Electronics - Gas Discharge and Gas-Discharge Instruments, H-7

Abst Journal: Referat Zhur - Fizika, No 12, 1956, 35161

    Author: Chapnik, I. M.

Institution: None

    Title: On the Theory of the Stratified Positive Column

Original
Periodical: Dokl. AN SSSR, 1956, 107, No 4, 529-532

    Abstract: The nonlinear equations for longitudinal oscillations of plasma,
             proposed by Granovskiy and generalized by the author, are used to
             obtain equations that relate the discharge parameters with the
             length of the period and the attenuation of the positive column in
             a stratified state. The problem is solved for the one-dimensional
             case and in a linear approximation (no account is taken of the change
             of the parameters of the discharge along the radius of the tube).
             The expressions obtained for the length, for the periodicity, and
             for the decrement of attenuation are in agreement with experiment.
             Bibliography, 11 titles.

Card 1/1

AUTHOR   CHAPNIK I.M.   PA - 3550
TITLE   The Theory of the Stratified Positive Column in the case of a
               Predominance of Volume Recombination.
               (Teoriya sloistogo polozhitel'nogo stolba v sluchaye preobla-
               dayushchey ob"yemnoy rekombinatsii.- Russian)
PERIODICAL   Zhurnal Tekhn. Fiz 1957, Vol 27, Nr 5, pp 978-980 (U.S.S.R.)

ABSTRACT   In the course of the preceding work (Doklady Akademii Nauk
               SSSR 1956, Nr 4, p 107) this theory was suggested, but on this
               occasion volume recombination was neglected. In the present
               case, however, the case is investigated on which volume
               recombination is the predominant process in connection with
               the vanishing of charged particles. In some cases such circum-
               stances may actually occur. The system of equations is again
               written down, but, in contrast to the previous work, the den-
               sities n_e and n_p are here assumed as constant according to the
               cross section of the tube. The linearization of the system
               of equations, like in the case of that in the previous paper,
               leads to a further system of equations of the amplitudes

               $\bar{\nu}_e$, ν_p, ζ_e of the slight deviations from the steady solution.

               In conclusion, equations for the periodicity length and for
CARD 1/2

PA - 3550

The Theory of the Stratified Positive Column in the case of a
Predominance of Volume Recombination.

the decrement of the dying down δ are derived. From these two
equations it is seen that in the case under investigation a
periodic solution must always exist; the cathode end of the
positive column serves as the place where stratification deve-
lops. The layers of the kind such as are obtained here are
much closer than the "ordinary" layers and do not obey the
law of similarity. The formula for the length of periodicity
is here derived for ions with very low degree of mobility.
The distance between the layers must in this case decrease
with gas pressure, and this must occur more rapidly than is
the case with "ordinary" layers.
(With 7 Slavic references.)

ASSOCIATION: not given.
PRESENTED BY: -
SUBMITTED: 23.7. 1956
AVAILABLE: Library of Congress.

CARD 2/2

SOV/56-34-6-17/51

AUTHOR: Chapnik, I. M.

TITLE: On the Mechanism of the Appearance of Striations in the
            Positive Column of a Gas Discharge (O mekhanizme vozniknoveniya
            sloistosti v polozhitel'nom stolbe gazovogo razryada)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1958, Vol. 34,
            Nr 6, pp. 1496-1503 (USSR)

ABSTRACT: The purpose of this paper is the explanation of the following
            mechanism of the appearance of the striations: In the regions
            of the discharge which lie on the boundaries of the positive
            column (for instance, in the Faraday (Faradey) dark space) the
            values of the average energy of the electrons, of the potential
            gradient and of other quantities may be different from those
            values which under given conditions are found in the positive
            column. Besides of a solution independent of the coordinate x
            (the x axis is parallel to the column) the equations of the
            electronion plasma have still solutions which are equal to the
            sum of the solution independent of the coordinate x and of the
            oscillating function $U_e(pa,x)=U_{ec}(pa)+ \xi(pa,x)U_{eo}(pa)$. U_e denotes
            the electron energy and U_{ec} the average energy of the electrons.

Card 1/3

On the Mechanism of the Appearance of Striations in the Positive Column of a Gas Discharge

The corresponding boundary conditions which take into account the discontinuity of the parameter on the boundary may be satisfied only by the periodic solution $U_{ec} + \mathcal{E}U_{ec}$. In the systems of equations which are discussed in this paper the adhesion processes of the electrons to the gas molecules the recombination in the volume and the step ionization (stupen-chataya ionizatsiya) are not taken into account. The calculations are discussed step by step. A diagram shows the obtained solutions of the "reestablishing force" and of the "potential energy" of the system discussed in this paper. The elastic force is rigid for the positive deviations of the electron energy and soft for the negative aberrations. The author reports also on a mechanical analogon of this system. One may change the form of the positive column (for instance make appear or disappear the atriations) by introducing a probe (zonda) into the cor-responding part of the column. The author thanks N. N. Bogolyubov, Member, Academy of Sciences, USSR, for the examination of this paper; V. L. Granovskiy, Professor; Ya. P. Terletskiy, Professor and A. A. Zaytsev for the discussion of the results and for

Card 2/3

SOV/56-34-6-17/51

On the Mechanism of the Appearance of Striations in the Positive Column of a Gas Discharge

useful remarks. There are 3 figures and 16 references, 9 of which are Soviet.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet (Moscow State University)

SUBMITTED: November 27, 1957

Card 3/3

30025
S/020/61/141/001/007/021
B104/B138

24.2140 (1160, 1164, 1482)

AUTHOR: Chapnik, I. M.

TITLE: Possible criteria of superconductivity

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 141, no. 1, 1961, 70 - 73

TEXT: Studies on the properties of various superconductors have been
reviewed in order to establish the following criteria for the origin of
superconductivity: The hole concentration must be sufficiently high
$(N_p > 10^{19} cm^{-3})$; the minimum interatomic distance must be limited to the
range between 2.6 - 2.9 and 4kX, and there must be no ferromagnetism or
strong paramagnetism. The author proves this criterion by a discussion
of special results of other scientists. The change in T_s during

compression and stretching of superconductors can be explained by these
criteria (B. Lazarev, L. Kan, ZhETF, 14, 463 (1944); N. Ye. Alekseyevskiy,
ZhETF, 10, 746 (1940)). The increase of T_s obtained by plastic de-
formation can be eliminated by annealing (G. Minnigerode, Zs. Phys., 154,

Card 1/2

30025
S/020/61/141/001/007/021
Possible criteria of ...   B104/B138

442 (1959). The mobility in superconductors is higher than in non-superconductors (I. Kikoin, B. Lazarev, ZhETF, 3, 44 (1933)). Mo, Ir, and Sb become superconductive by deformation (D. Shenberg, Sverkhprovodimost' (Superconductivity), 1955; A. Shal'nikov, ZhETF, 10, 630 (1940); W. Buckel, Zs. Phys. 154, 474 (1959)). The anomaly shown by Tl during strong compression is attributed to an increase of N_p in

consequence of the appearance of a disordered lattice (L. Kan, B. Lazarev, A. Sudovtsev, DAN, 69, 173 (1949)). There are 4 tables and 21 references: 11 Soviet and 10 non-Soviet. The three most recent references to English-language publications read as follows: W. Pearson, Handbook of Lattice Spacings and Structures of Metals and Alloys, 1958; R. Hein, Phys. Rev., 102, 1511 (1958); B. Matthias, V. Compton, H. Schull, E. Correnzwit, Phys. Rev., 115, 1597 (1959).

ASSOCIATION: Novosibirskiy gosudarstvennyy universitet (Novosibirsk
               State University)

PRESENTED: June 1, 1961, by I. K. Kikoin, Academician

SUBMITTED: February 1, 1961
Card 2/2

L 53684-65   EWT(1)/EPA(s)-2/EPA(w)-2/EEC(t)/EWA(m)-2   Pab-10
ACCESSION NR: AP5012339   UR/0288/65/000/001/0081/0090

AUTHOR: Chapnik, I. M.

TITLE: Mechanism for layer generation within a gas discharge

SOURCE: AN SSSR. Sibirskoye otdeleniye. Izvestiya. Seriya tekhnicheskikh nauk, no. 1, 1965, 81-90

TOPIC TAGS: positive column layer theory, discharge layer generation, moving gas discharge layer, gas discharge, Schottky theory, stratified discharge column

ABSTRACT: In spite of the recent suggestions of numerous researchers (see, e.g., G. Francis, Handbuch der Physik, Bd. 22, Tl 2, B. Springer, 1956; V. I. Gaponov, Elektronika, Part I, M., Fizmatgiz, 1960; Bito Janos, Magyar fiz. faliorat, 1962, 10, 303), the author considers the positive stratified column to be a solved enigma and develops the theory of the stratified discharge column as a generalization of the Schottky theory of the homogeneous column. The exposition is based on previous papers by the same author (I. M. Chapnik, Dokl. AN SSSR, 1956, 107, 529; Zh. tekhn. fiz., 1957, 27, 978; Zh. eksperim. i teor. fiz., 1958, 34, 1496). It covers the mechanism of production of stationary layers, the .

Card 1/2

L 53684-65

ACCESSION NR: AP5012339

moving layers, and the double layer. The article concludes with an extended pictorial interpretation of the underlying events. Orig. art. has: 19 formulas, 6 figures, and 1 table.

ASSOCIATION: Novosibirskiy elektrotekhnicheskiy institut (Novosibirsk Electrical Engineering Institute)

SUBMITTED: 29Feb64   ENCL: 00   SUB CODE: ME

NO REF SOV: 018   OTHER: 023

Card 2/2

CHAPNIK, V.B.

Reorganization of production lines. Shvein.prom. no.2:8-10
Mr-Ap '62.   (MIRA 15:4)
    (Leningrad--Clothing industry) (Assembly-line methods)

CHAPNIK, Ye.I.

Combinations such as "stone wall" and "Moscow students" in modern English. Uch. zap. RGPI 22:27-43 '61. (MIRA 17:4)

37925
S/181/62/004/005/009/055
B102/B138

AUTHORS: Vavilov, V. S., Smirnova, I. V., Chapnin, V. A.

TITLE: The interaction of lithium atoms introduced into silicon
with the radiation defects of the structure

PERIODICAL: Fizika tverdogo tela, v. 4, no. 5, 1962, 1128-1131

TEXT: The authors studied the interaction of Li impurity atoms in Si
single crystals with the structural defects that were produced by fast-
electron bombardment. The Li impurity was introduced by diffusion from
a Sn-Li melt containing $0.2 - 1\%$ Li. Li equilibrium concentration in
Si was reached at $550-650^\circ$C. The Li samples were p-type ($\rho \sim 150$ ohm·cm)
and cut out of single crystals. After introduction of Li the p-type
samples were transformed to n-type with carrier concentrations of
$3 \cdot 10^{14} - 10^{16}$ cm^{-3}. Since Li formed oxide ions LiO$^+$, which have shallow
donor levels and are relatively stable at room temperature, the carrier
concentration (n) equals the sum of the ions Li$^+$ + LiO$^+$. Electron
bombardment (0.9 Mev) took place at room temperature. At Li concentrations
Card 1/3

The interaction of lithium atoms ...   S/181/62/004/005/009/055
                                            B102/B138

of $3 \cdot 10^{14} - 5 \cdot 10^{15} cm^{-3}$ two level groups were found in the upper half of the forbidden band: $E_c - 0.17$ and 0.4 ev. For the level E_b which is filled with electrons $E_b = 0.17$ ev is found. When the irradiated samples are heated to $330-350°K$ the carrier concentration was found to be greatly reduced. The results, presented by a curve, which has three sections, can be described by

$$\frac{n}{n_0} = Ae^{-\frac{t}{\tau_1}} + Be^{-\frac{t}{\tau_2}} + Ce^{-\frac{t}{\tau_3}},$$

$$\tau_1 < \tau_2 < \tau_3.$$

(1).

The effective diffusion coefficient $D_{eff} = 0.1\% D_0$, D_0 is the diffusion coefficient of Li when O is absent. There are 2 figures.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova (Moscow State University imeni M. V. Lomonosov)

SUBMITTED: December 8, 1961

Card 2/2

VAVILOV, V. S.; SMIRNOVA, I. V.; CHAPNIN, V. A.

"On Defects Introduced by Fast Electrons into Silicon Doped by Lithium"

Paper was submitted at the International Conference on
Crystal Lattice Defects at Kyoto, 7-12 Sep '62

(for Vavilov, v. s.) P. N. Lebedev Inst. of Physics
Leninsky, Prospect 53, Moscow

L 8938-66   EWT(l)/EWT(m)/EWP(t)/EWP(b)   IJP(c)   JD

ACC NR: AP5026856   SOURCE CODE: UR/0170/65/009/004/0536/0537

AUTHOR: Chapnin, V. A.

ORG: Physics Institute im. P. N. Lebedev, Moscow (Fizicheskiy institut)

TITLE: Joule heating of germanium and gallium arsenide in liquid nitrogen

SOURCE: Inzhenerno-fizicheskiy zhurnal, v. 9, no. 4, 1965, 536-537

TOPIC TAGS: germanium, arsenide, gallium compound, Joule law, electric resist-ance

ABSTRACT: The article presents the results of a determination of the maximum dis-sipation power for germanium and gallium arsenide in liquid nitrogen. The samples were rectangular blocks of p-Ge and n-GaAs ($p \sim 10^{14}/cm^3$, $n \sim 10^{17}/cm^3$) with dif-ferent surface areas (0. 2-7. 5 cm^2). The degree of heating up of the samples was determined from the form of the volt ampere characteristics, and from the depend-ence of the resistance and the temperature on the power evolved. At samll powers up to 0. 01 watts, the samples were at the temperature of liquid nitrogen and Ohm's law was obeyed. With a further increase in the power, the temperature of the sam-ples increases up to 80-83 K, while the resistance also increases. The dissipation is determined from the lattice vibrations. In this region, the degree of heating is not

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UDC: 536. 7+536. 78

L 8938-66

ACC NR: AP5026856

directly proportional to the surface area of the samples. When the critical power of 13 ± 3 watts/cm^2 is reached, a sharp temperature jump takes place up to 100-120 K, the resistance jumps by 2-3 times (due to the decrease of the mobility), and the current falls. Again, when the critical power is reached, there are temperature jumps up to 400 K and the current increases. The presence of hysteresis in the volt ampere characteristics indicates that the power necessary for the appearance of a temperature jump is less than the power required for maintaining a "punctured" state. Analogous results were obtained for gallium arsenide. However, on attainment of the critical power of 13 watts/cm^2 the temperature increases suddenly up to approximately 450 K (this is connected with the constant nature of n and μ in the interval from 80 to 450 K). The coincidence of the critical powers for germanium and gallium arsenide proves that the temperature jumps are connected with the behavior of liquid nitrogen, in particular, with the formation of a gas jacket around the sample and a decrease in heat transfer. The significant degree of heating up of the samples at low powers is evidently connected with the superheating of the liquid phase, as well as with a decrease in heat conductivity with a rise in temperature. Orig. art. has: 2 figures.

SUB CODE:IC, MM/ SUBM DATE: 09Feb65/ ORIG REF: 003/ OTH REF: 001

Card 2/2

44163

S/181/62/004/012/003/052
B104/B102

AUTHORS: Smirnova, I. V., Chapnin, V. A., and Vavilov, V. S.

TITLE: Radiation defects in lithium-doped silicon

PERIODICAL: Fizika tverdogo tela, v. 4, no. 12, 1962, 3373-3380

TEXT: The effect of lithium on the formation of stable radiation
defects in silicon and on the annealing of these defects is studied by
determining the temperature dependence of the carrier concentration from
the Hall effect. The lithium was introduced into Si single crystals by
diffusion annealing (550-650°C) from a tin-lithium alloy. The single
crystals had a resistivity of 100 ohm·cm; after doping they had n-type
conductivity. The carrier concentration lay between $3 \cdot 10^{14}$ and
$2 \cdot 10^{17}$ cm^{-3}. The specimens were irradiated by 0.9-Mev electrons at room
temperature. Results: In n-type silicon with lithium up to concentrations
of $(1-2) \cdot 10^{17}$ cm^{-7}, shallow energy-levels arise in the range from 0.06
to 0.14 ev below the bottom of the conduction band, which are related to
primary radiation defects, e.g., to pairs of interstitial atoms and

Card 1/2

Radiation defects in ...

S/181/62/004/012/003/052
B104/B102

vacancies which are separated by different distances. The lithium in the Si crystal interacts with these defects. Such interaction is similar to the processes that occur during the annealing of genetically unrelated vacancies and interstitial atoms. The trapping radius has the same order as the lattice constant, (r_{min} = 5.4·10^{-8} cm). In crystals that, after part of the lithium has been deposited in the defects, are again of p-type conductivity, the levels 0.45 ev, 0.28 ev and 0.21 ev were observed above the top of the valency band. The centers corresponding to the level E_v + 0.28 ev did not disappear completely even during annealing for several hours at 450°C and above; those corresponding to the level E_v + 0.21 ev disappeared completely during annealing at 450°C. There are 4 figures.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M.V. Lomonosova
              (Moscow State University imeni M.V. Lomonosov)

SUBMITTED: June 16, 1962

Card 2/2

L 38524-65   EPF(c)/EPA(w)-2/EWT(1)/EWT(m)/EWP(b)/T/EWA(m)-2/EWP(t)   Pr-4/Pab-10
IJP(c)   RM/JD

ACCESSION NR: AP5005292   S/0181/65/007/002/0506/0512

AUTHOR: Chapnin, V. A.

TITLE: Impact ionization in germanium doped with zinc

SOURCE: Fizika tverdogo tela, v. 7, no. 2, 1965, 506-512

TOPIC TAGS: germanium, doping, impact ionization, electric breakdown, carrier phonon interaction

ABSTRACT: The article deals with impact ionization of zinc in german... ... the impurity level a_i = 0.009 eV. The experiments were made at ... ... were ... with ... ..., respectively. The ... ... with a DESO-1 oscilloscope. Some 50 samples with effective acceptor density between 2.0 x 10^{14} and 2.0 x 10^{16} cm-3 and with zinc-atom density 4 x 10^{14} ... x 10^{17} cm-3 were investigated. The results show that the breakdown ... to 3.5 x 10^3 V/cm in the interval 4.2—20.4K and rises to 6 x $10^?$ ... ...

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L 38524-65

ACCESSION NR: AP5005292

temperature. It is also established that the breakdown field is practically in-
dependent of the effective concentration of the acceptors in the interval 2×10^{14}
to 2×10^{16} cm^{-3}. The results are interpreted on the basis of the theory of impact
ionization with account of the interaction between the carriers and the acoustic
and optical phonons. "The author thanks V. A. Chuyenkov for interest and dis-
cussion of the results and V. I. Kononenko for help with the work." Orig. art.
has: 4 figures, 10 formulas, and 2 tables.

ASSOCIATION: Fizicheskiy institut im. P. N. Lebedeva AN SSSR, Moscow (Physics
Institute, AN SSSR)

SUBMITTED: 29Jul64   ENCL: 00   SUB CODE: SS, GC

NR REF SOV: 009   OTHER: 008

Card 2/2 rw

L 21229-66   EWT(m)/T/EWP(t)   IJP(c)   JD
ACC NR: AP6003804   SOURCE CODE: UR/0181/66/008/001/0256/0258

AUTHORS: Vul, B. M.; Chapnin, V. A.

ORG: Physics Institut im. P. N. Lebedev AN SSSR, Moscow
(Fizicheskiy Institut AN SSSR)

TITLE: Interaction between lithium and lattice defects in cadmium
telluride

SOURCE: Fizika tverdogo tela, v. 8, no. 1, 1966, 256-258

TOPIC TAGS: lithium, cadmium telluride, crystal lattice defect,
impurity level, drift mobility, valence band, capture cross section,
radiation damage

ABSTRACT: The authors obtained low-resistance p-type CdTe by dif-
fusion of lithium from the vapor phase in high-resistance p-type
CdTe at 900C in saturated vapor of cadmium. The lithium produces in
the CdTe a shallow acceptor level. The lithium was found to have a
high mobility even at room temperature, so that it cannot be used to
produce a pn junction. A reason for this pehnomenon is the inter-

Card 1/2

L 21229-66

ACC NR: AP6003804

action between the lithium and the lattice defect present in the cadmium telluride as a result of deviation from stoichiometry. This phenomenon is similar to that previously observed for interaction between lithium and radiation defects in silicon. Because of its high mobility the lithium migrates to the crystal and when it encounters defects it attaches itself to them in the form of neutral atoms, capturing holes from the valence band. The accompanying change in the resistance was measured at several temperatures and the results are plotted. It is deduced that the diffusion coefficient of lithium should be less than approximately $10^{-14} cm^2/sec$ at 60C. It is concluded that this phenomenon can be used to control the degree of perfection of crystals and also to heal radiation defects at relatively low temperatures. Orig. art. has: 2 figures and 1 formula.

SUB CODE: 20/   SUBM DATE: 27Jul65/   ORIG REF: 002/ OTH REF: 001

Card   2/2 ddu

L 42811-66   EWT(m)/T/EWP(t)/ETI   IJP(c)   JD/JH

ACC NR: AP6026706   SOURCE CODE: UR/0181/66/008/008/2466/2467

AUTHOR: Chapnin, V. A.

ORG: Physics Institute im. P. N. Lebedev, AN SSSR, Moscow (Fizicheskiy institut AN SSSR)

TITLE: A luminescent cadmium telluride diode

SOURCE: Fizika tverdogo tela, v. 8, no. 8, 1966, 2466-2467

TOPIC TAGS: luminescent material, cadmium telluride, optic material

ABSTRACT: The author describes a luminescent surface-barrier CdTe diode.   The diodes were made with n-CdTe with a carrier concentration $\sim 10^{14} cm^{-3}$ and mobility of $\sim 1.2 \times 10^3 cm^2/v \cdot sec$ at 300K. Al was introduced into the initial material by diffusion at 800C in saturated cadmium vapors. As a result of diffusion, the carrier concentration rose to $5 \cdot 10^{16} cm^{-3}$ and mobility dropped to $1 \cdot 10^3$. Contacts (indium on one side and gold on the other) were deposited on CdTe plates, which were then heat treated at 300C for 30 min in a vacuum. Recombination radiation was observed in the direction parallel to the p-n junction plane with linear voltage application. The volt-ampere characteristics of the diodes are normal and maintain voltage in the reverse direction up to 20 v. Diode resistivity in a linear direction is $\sim 50-100$ ohm at 300K and it drops somewhat at 80K. The relationship $c^{-2} = f(u)$ is in a majority of cases linear; however, for some specimens saturation of capacities occurs at voltages

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L 42811-66

ACC NR: AP6026706

above 5 v. In conclusion, the author expresses his gratitude to B. M. Vul for critical comments, and to S. A. Medvedev and S. N. Maksimovskiy for the materials presented. Orig. art. has: 1 figure.

[26]

SUB CODE: 20/ SUBM DATE: 28Jan66/ ORIG REF: 002/ OTH REF: 004/ ATD PRESS: 5067

Card 2/2

CHAPNITSKIY, L. A.

Cost accounting for construction work in the building associations Moskva, Gos.
izd-vo stroit. lit-ry, 1950. 111 p. (Biblioteka stroitelia po voprosam ekonomiki i
planirovaniia) (51-15253)

HF5686.B7C48

CHAPNITSKIY, L   A

Uchet i kal'kulirovaniye stoimosti stroitel'nogo proizvodstva (Accounting and calculation of value of the construction output) Izd. 2 dopol i perer. Moskva, Gos. Izd-vo Lit. po Stroitel'stvu i Arkhitekture, 1952. 171 p. tables.

N/5
748.1Ø1
.C4
1952

CHAPO, ELEK

B. T. A.
V. 3 No. 3
Mar. 1954
Metals- Heat
Treatment

3771* Gaseous Annealing of Malleable Castings. (Hungarian.) Elek Chapó. Öntöde, v. 4, no. 8, Aug. 1953, p. 165-170. Various reactions involved in annealing white cast iron are discussed. Describes effect of gas atmosphere upon decarburation and graphitization; influence of H in furnace atmosphere, and effect of Mn-S ratio of Fe upon annealing rate. Table, graphs. (To be continued.)

CHAPO, E.

B. T. R.
Vol. 3 No. 4
Apr. 1954
Metals-Heat Treatment

5319* Annealing in a Gaseous Atmosphere. II. (Hungarian.) Elek Csapó. *Öntöde*, v. 4, no. 9, Sept., p. 185-189. Describes structure and operation of annealing furnaces. Advantages of annealing in a gaseous atmosphere are reviewed. Diagrams, table. 9 ref.

95. The effect of chromium and boron on the quality of malleable cast iron — A krom és bór hatása a temperöntvény minöségére — T. Chapó. (Foundry — Kohászati Lapok, Ontöde — Vol. 5, 1954, No. 2, pp. 25–30, 16 figs., 3 tabs.)

The combined effect of chromium and boron on the production of malleable cast iron was investigated in order to eliminate the harmful effect of chromium contained in the scrap added to the charge. Experiments were also conducted on an industrial scale with malleable cast iron for the manufacture of fittings. It was found that a 0.0015% boron content had a slight stabilizing effect on carbides, a higher percentage had an increased graphitizing effect. Boron in a thousandth per cent order probably has a great graphitizing i.e. nucleus-forming effect. Due to its stabilizing properties in carbide the interval of carbide decomposition is somewhat increased while the interval of pearlite decomposition is more effectively reduced. Assuming an identical period of heat treatment boron has a detrimental influence on strength properties, the strength properties of black-heart malleable cast iron, contaminated with chromium but alloyed with boron, are identical with those of white-heart malleable cast iron. In case of 0.08 to 0.1% chromium content treatment with 0.003 to 0.005% boron is the most advantageous.

Condition for the Preparation and Quality Properties of Nodular Grey Cast Iron. F. Vanca, H. Kenis, L. Cser, K. Janossy, and K. Sinn. (Kohaszati Lapok, 1954, 9. Aug., 155-102; Sept., 183-211). The development of nodular grey iron production in Hungary and other countries is reviewed. Numerous experiments in the Hungarian Iron and Steel Research Institute confirm the principle that a successful inoculation depends both on the low carbon content and the superheating of the melt. An increasing steel scrap content in the charge decreases the carbon content in the melt. Simultaneously an increase in tensile strength was observed in case of properly performed inoculations. The inoculation effect of CaSi has always been found better than that of FeSi. — L. K.

CHAPO, ELEK.

Manufacturing Conditions and Properties of Modified Cast Iron. A modositott öntöttvas gyártási feltételei és Elek Chapo, Kázmér Istvány, and Ferenc Varga, Béla Kónis, tulajdonságai. II. (Hungarian.) Ferenc Varga, Béla Kónis, Elek Chapo, Kázmér Istvány, and Rezsö Sima. Öntöde, v. 5 1951, p. 191-208.

Extensive investigations for the purpose of determining data for introduction of the Fe. Tables, graphs, micrographs. 15 ref.

VARGA, Ferenc; KOROS, Bela; CHAPO, Elek; JANOSSY, Kazmer; SIMA, Rezso

Manufacturing conditions and properties of modified cast
iron. Pt. 2. Koh lap 9 no. 9: Supplement: Ontode 5 no. 9:
193-208 S '54.

CHAPO, Elek

Effect of chromium and boron on the quality of malleable cast
iron. Koh lap 9 no. 2: Supplement: Ontode 5 no. 2: 25-30
F '54.

1. Vasipari Kutato Intezet.

CHAPO, Elek, okleveles gepeszmernok

Significance of slag control in iron foundries. Koh lap 12
no. 11/12 Supplement: Ontode 8 no. 11/12 237-242 N-D '57.

1. "Kohaszati Lapok" szerkeszto bizottsagi tagja.

CHAPO, E.

The importance of slag control in iron foundries.

P. 237. (ONTODE.) (Budapest, Hungary) Vol. 7, No. 11/12, Nov./Dec. 1957

SO: Monthly Index of East European Accession (EEAI) LC. Vol. 7, No. 5, 1958

CHAPO, E.,   Koros, B., Kollar, K.

Evaluating the average life of ingot molds in steel factories by means of math-
ematical analysis. p. 20.
(ONTODE, Vol. 8, no. 1/2, Budapest, Hungary)

SO: Monthly List of East European Accessions (EEAL) LC. Vol.6, no. 12, Dec 1957.
     Uncl.

CHAPO, E.

W. Kamekichi's "Japanese Iron Production", a review of an article.

p. 262. (KOHASZAT LAPOK) Vol. 12, no. 6, June 1957
Budapest, Hungary

SO: Monthly Index of East European Accessions (EEAI) LC, Vol. 7, No. 3,
March 1958

CHAPO, E.

TECHNOLOGY

PERIODICAL: KOHASZATI LAPOK, Vol. 13, no. 7, July 1958

Chapo, E. Development of manufacturing malleable cast iron in Hungary
and abroad. p. 152.

Monthly list of East European Accessions (EEAI) LC, Vol. 8, No. 2,
                                          February 1959, Unclass.

CHAPO, Elek

Report on the 9th general meeting of the Institute of Indian
Foundrymen. Koh lap 93 no.1:Suppl: Ontode 11 no.1:18 Ja '60.

1. "Kohaszati Lapok" szerkeszto bizottsagi tagja.

CHAPO, Elek, okleveles gepeszmernok

Gas-phase annealing experiments. Koh lap 93 no.3:Suppl: Ontode 11 no.3:49-55 Mr '60.

1. Vasipari Kutato Intezet; "Kohaszati Lapok" szerkeszto bizottsagi tagja.

CHAPO, Elek

Announcement of a contest. Koh lap 95:Suppl.:Ontode 13 no.6:
143 Je '62.

1. Orszagos Magyar Banyaszati es Kohaszati Egyesulet Biralo
Bizottsaga elnoke.

CHAPO, Elek, okleveles gepeszmernok

Crack detection on thin-walled castings. Koh lap 97 no.11: Suppl:
Ontode 15 no.11:241-249 N '64.

1. Iron Industry Research Institute, Budapest, and Editorial board
member, "Kohaszati Lapok."

C hapo, Nemesh

RUMANIA/Soil Science. Genesis and Geography of Soils.   I-2

Abs Jour: Referat Zh-Biol., No 6, 25 March, 1957, 22427.

Author : Chapo. Nemesh
Inst   :
Title   : Nomenclature and Classification of Soils in Transylvania.

Orig Pub: Studii si cercetari stiint. Acad. R.P.R. Fil. Cluj, 1954,
          ser. 2, 5, No 3-4, 201-220

Abstract: Names of soils must reflect the basic physico-chemical and bio-
          logical processes which occur in those soils under the influence
          of cultivation, fertilization, etc. An example is given of division
          of the Rumanian People's Republic's principal soils into types,
          subtypes, groups and varieties. The suggested classification of
          the Republic's soils, particulary Transylvania's, is made by taking
          into account the climatic peculiarities of the territory, soil-
          forming types, and the character of the vegetative cover. A de-
          lineation of Panon, Karpat, Dak and Pont soil provinces within

Card   : 1/2   -2-

RUMANIA/Soil Science. Genesis and Geography of Soils.   I-2

Abs Jour: Referat Zh-Biol., No 6, 25 March, 1957, 22427

the Republic's borders is suggested. The scheme of soil classifi-
cation of Transylvania and the Rumanian People's Republic is
given. The studies were carried out in the agronomical institute
of Glyui.

Card   : 2/2   -3-

RADNOT, M.; ROSLAVTSEV, A.V., prof.; SIZA, Mario, doktor [translator];
    VEYNSHTEYN, P., doktor med. nauk, nauchnyy red.; CHAPODI, I.,doktor
    med. nauk, nauchnyy red.; BERNAT, D'yerd', otv. izd.; ERDI, K., otv.
    red.; CHERGE, I., tekhn. red.

[Atlas of eye diseases] Atlas glaznykh boleznei. Budapest, Izd-vo
Akad. nauk Vengrii. Vol.1. 1962. 188 p.   (MIRA 15:1)

1. Chlen-korrespondent AN Vengrii (for Radnot). 2. Direktor moskov-
skogo instituta glaznykh bolezney im. Gel'mgol'tsa (for Roslavtsev).
            (EYE—DISEASES AND DEFECTS)
            (ANATOMY, PATHOLOGICAL—ATLASES)

CHAPOROVA I.N.

PROCESSES AND PROPERTIES INDEX

Preparation of Polished Sections and the Resolution of the Microstructure of Metallic-Ceramic Solid Alloys. I. N. Chaporova. (Zavodskaya Laboratoriya, 1949, vol. 15, July, pp. 796-806). [In Russian]. Methods are described which have been proved satisfactory for the preparation of sections of solid alloys, based on tungsten carbide, for the study of microstructure. Sections were prepared with the aid of a rotating carborundum disc, followed by preliminary polishing with boron carbide powder wetted with paraffin. For further preliminary polishing, two sizes of alcohol-wetted diamond dust were used. Final polishing was carried out either with diamond dust down to 1 μ particle size or with a suspension of alumina. The procedure for etching the polished sections and for identifying the microstructure is described and tabulated, some photomicrographs of typical structures being shown.—G. E.

METALLURGICAL LITERATURE CLASSIFICATION

CHAPOROVA, I. N.

Used/Metals
Ceramics
Microstructure
Techniques

Preparation of Microsections and Exposing the Microstructure of Hard Metalloceramic Alloys," I. I. Chaporova, Moscow Combine for Hard Alloys,

"Prod Lab" No 7 --- Jul 49

Describes threefold process for preparing micro-sections of hard metalloceramic alloys (86-92Re): obtaining a flat surface, microsectioning, and polishing. Alloy consisted basically of tungsten
62/49785

Used/Metals (Cont'd)

carbide. Extensive table shows results of using various etching fluids and etching conditions for the specific cases. Includes microphotographs of the microstructure for these different cases.

Jul 49
62/49785

CHAPOROVA, I. N.

CHAPOROVA, I. N. - Author's abstract of a dissertation on the subject of an
"Investigation of the process of froamtion of a solid solution from the
interaction of tungsten carbide and titanium carbide in a mixture of powders",
presented toward the eademic degree of Candidate of Technical Sciences.
Moscow, 1955. Min Higher Education USSR. Moscow Inst of Nonferrous Metals
and Gold imeni M. I. Kalinin. (Dissertation for the degree of Candidate
of Technical Science).

SO: Knizhnaya Letopis' No. 46, 12 November 1955. Moscow

AUTHORS: Vasil'yeva, N. P., Sultanyan, T. A.,   SOV/32-24-9-2o/53
              Chaporova, I. N.

TITLE: The Method of Electron-Microscopic Examination of the
              Intragranular Structure of Pulverulent and Compact Tungsten
              (Metodika elektronnomikroskopicheskogo issledovaniya
              vnutrizerennoy struktury poroshkoobraznogo i kompaktnogo
              vol'frama)

ABSTRACT: In the present case an electron-microscopic method
              was employed for the examination of the submicrostructure
              of pulverulent and compact tungsten samples. The
              tungsten powder was obtained by a reduction from tungstic
              anhydride by means of hydrogen at 900° and 1200°. The
              synthetic material AKR-7 (emulsion polymethyl metha-
              crylate) was employed as binder for the powder and a
              mixture of a 20% potassium ferricyanide solution and
              caustic potash solution served as etching agent in
              order to obtain the structure mentioned in the title.
Card 1/2   It was found that titanium replicas are best suited

The Method of Electron-Microscopic Examination of the   SOV/32-24-9-2o/53
Intragranular Structure of Pulverulent and Compact Tungsten

to reproduce the submicrostructure. The most reasonable
results were obtained at a vacuum of not less than 10^{-4}
mm Hg and a weighed sample of 0,008-0,009 g. The tungsten
powder obtained at 1200° consists of granules with
dimensions of 10 to 200µ. A decrease of reduction
temperature to 800° - 900° entails a decrease of granules
to 1-2µ. Pictures of the submicrostructures obtained and
corresponding explanations are given. There are 3 figures
and 2 references,   which are Soviet.

ASSOCIATION: Vsesoyuznyy nauchno-issledovatel'skiy institut tverdykh
splavov (All-Union Scientific Research Institute of Hard Alloys)

Card 2/2

AUTHORS: Svistunova, Z. V., Chaporova, I. N.,   SOV/32-24-9-21/53
             Vasil'yeva, N. P., Sultanyan, T. A., Kiselev, V. Ye.

TITLE: An Electron-Microscopic Investigation of the Structure of
             Powder-Metallurgical Hard Alloys (Elektronnomikroskopicheskoye
             issledovaniye struktury metallokeramicheskikh tverdykh splavov)

PERIODICAL: Zavodskaya Laboratoriya, 1958, Vol. 24, Nr 9, pp 1093-1095
             (USSR)

ABSTRACT: In this paper experimental results obtained by employing new
             methods of producing replicas for structural examinations of
             hard alloys are given. Furthermore, the conditions for
             polished section etching are determined. The polished sections
             of hard alloys of the types BK 6, BK 8, BK11, T15K6 and T30K4
             were produced as usual, the method of polishing by etching
             being employed. The reagents used and the conditions are given
             in a table. It is observed that satisfactory results are
             obtained by titanium and collodion replicas. Quartz replicas
             have the disadvantage of being non-resistant. Among other
             facts the results mentioned show that the alloys of tungsten
Card 1/2   carbide with cobalt, a normal carbon content provided, consist

An Electron-Microscopic Investigation of the Structure SOV/32-24-9-21/53
of Powder-Metallurgical Hard Alloys

> of two phases- the tungsten carbide and the solid solution
> of tungsten and carbon in cobalt. The fine-grained alloy
> BK consists of tungsten carbide granules of 0,4 to 0,7μ.
> Pictures of the microstructures obtained are given.
> There are 4 figures, 1 table, and 8 references, 6 of which
> are Soviet.

ASSOCIATION: Vsesoyuznyy nauchno-issledovatel'skiy institut tverdykh
splavov (All-Union Scientific Research Institute of Hard
Alloys)

Card 2/2

/P. 6100

67802

SOV/180-59-5-14/37

AUTHORS: Chaporova, I.N., and Shchetilina, Ye.A. (Moscow)

TITLE: Solubility of Tungsten Carbide in Cobalt and Nickel

ABSTRACT: The author mentions the diversity of published opinions
          on the solubility limits of tungsten carbide WC in
          cobalt and nickel (Refs 1-8). The object of the present
          work was the more precise determination of the
          solubility in cobalt compared with that in nickel and
          the study of some of the properties of the solid
          solutions formed. Alloys were prepared from tungsten-
          carbide, cobalt and nickel powders (Table 1). For
          solubility determinations mixtures of cobalt with 2, 4,
          6, 10, 12, 15, 18 and 20 weight % WC and of nickel with
          6, 15, 18 and 20 weight % WC were prepared. Compacted
          cylinders 18 mm in diameter covered in graphite
          particles were reduced in a hydrogen stream at 700-800°C
          for 5 hours. Alloys were prepared by fusion and
          sintering for 1-2 hours at 1200-1450 °C in a laboratory
          vacuum furnace, followed by cooling in the furnace at
          about 200-300 °C per minute to 700-800 °C.

Card
1/3

67802

SOV/180-59-5-14/37

Solubility of Tungsten Carbide in Cobalt and Nickel

Carburizing (to make good the C-deficiency of the WC preparation) sintering of specimens at 1250-1450 °C was effected in a current of hydrogen in contact with carbonaceous material. Microstructural investigation showed that the WC-Co alloys with under 12% WC contain a single phase (Fig 1) and those with over 12%, two (Fig 2). Carburizing treatment led to the appearance of lamellar graphite inclusions (2, 4 and 6% WC) and also (10, 12, 15 and 18% WC) a WC phase in a eutectic. Rapid cooling in water gave a WC + Co-phase + C eutectic at grain boundaries (Fig 3); cooling in the furnace gave the corresponding two binary eutectics. The author concludes that with excess carbon the solubility of WC in cobalt at the eutectic temperatures does not exceed 10 weight %. The authors' previous work (at VNIITS in 1954-56) indicates (Fig 4a) that a higher solubility is obtained with lower carbon contents. For the nickel alloys prepared by vacuum sintering at 1200-1425 °C rapid quenching was adopted. Fig 5 shows the absence of WC-phase particles and the presence of carbon inclusions in the 15% WC alloy vacuum melted at 1380 °C. Fig 6 shows

Card
2/3

Solubility of Tungsten Carbide in Cobalt and Nickel   SOV/180-59-5-14/37

67802

individual crystals of WC and nickel-graphite eutectic in the 18% alloy vacuum melted at 1350 oC. In 15% alloys obtained under carburizing conditions no WC phase was detected. The authors conclude that the limiting solubility of WC in nickel in the presence of structurally free carbon is about 15 wt %. The results of X-ray investigation (including lattice-parameter determinations of cobalt) of WC-Co alloys are given in Table 2; they confirm those of microscopic examinations of the same samples. Fig 7 shows the lattice parameter of nickel in relation to the WC-content, the value rising from 3.517 for pure Ni to 3.545 Å for melted 20% WC alloy. Here too X-ray results confirm those of microscopic investigation. Microhardness determinations showed that with increasing WC-content and especially after the appearance of the WC-phase the microhardness rises. Fig 8 shows the micro-hardness vs WC-content for nickel; this was always less than that of the cobalt-base alloys.
There are 8 figures, 2 tables and 8 references, of which 2 are Soviet, 5 English and 1 German.

Card 3/3

SUBMITTED: May 22, 1959

AUTHORS: Shchetilina, Ye.A. (Engineer) and   SOV/129-59-6-5/15
         Chaporova, I.N. (Cand.Tech.Sci.)

TITLE: Interaction of Niobium Carbide with Cobalt
          (Vzaimodeystviye karbida niobiya s kobal'tom)

ABSTRACT: For investigating the system Niobium Carbide - Cobalt,
          the specimens were produced by powder metallurgy
          methods from pulverized niobium carbide and cobalt.
          The chemical analyses of these materials are entered in
          Table 1, page 19. The specimens were placed in
          corundum crucibles which were put into graphite dishes
          and heated for two hours at 1250, 1300, 1320, 1340,
          1350, 1375 and 1400 °C followed by rapid cooling
          (hardening) in the coolers (refrigerators) of the
          furnace. The specimens were sintered at 1225, 1450 and
          1550 °C and during the tests temperature was controlled
          automatically with an accuracy of ± 5°C. Data on the
          state of the specimens after sintering and the results
          of microstructure investigations of some of these are
Card1/3   entered in Table 2, page 20. In Figs 1-3 (plates)

Interaction of Niobium Carbide with Cobalt   SOV/129-59-6-5/15

microstructure photographs are reproduced of cobalt with various percentages of NbC. In Fig 4 the dependence is graphed of the linear shrinkage of the investigated alloys on the sintering temperature. In Fig 5 the dependence is graphed of the linear shrinkage as a function of the carbide content for the sintering temperatures 1250 - 1235 °C. In Fig 6 an approximate diagram of state of the system NbC-Co is reproduced, which is based on the data derived from the here-described investigations. On the basis of the data of the metallographic investigations and measurement of the shrinkage of the specimens during sintering, it was established that the eutectic appears for a NbC content of about 0.5 mol %. Consequently it can be assumed that the solubility of niobium carbide in cobalt at the fusion temperature of the eutectic does not exceed 0.5 mol %. This was also confirmed by X-ray data; the lattice parameters of pure cobalt and of the cobalt phase in the alloys containing 0.5 - 3 mol % NbC did not differ. Comparing the here-given

Card 2/3   data on the system NbC-Co with results of investigations

Interaction of Niobium Carbide with Cobalt   SOV/129-59-6-5/15
        of the system TiC-Co published earlier (Ref 6), an
    anology can be observed between the interaction of
    niobium carbides and of titanium with cobalt: both
    systems are eutectic in character, the maximum
    solubility in the solid state is approximately the same
    in both cases and the fusion temperatures and the
    composition of the eutectics also did not differ
    greatly.
        There are 6 figures, 3 tables and 6 references, 5 of
    which are Soviet and 1 English.

ASSOCIATION: Vsesoyuznyy nauchno-issledovatel'skiy institut
    tverdykh splavov (All-Union Scientific Research
    Institute for Hard Alloys)
Card3/3

34704
S/137/62/000/002/049/144
A006/A101

/5. 24C0

AUTHORS: Chaporova, I. N., Shchetilina, Ye. A., Serebrova, S. I.

TITLE: On the effect of the composition of carburizing phases on some
             mechanical properties of cermet WC-Co and WC-Ni sintered carbides

PERIODICAL: Referativnyy zhurnal, Metallurgiya, no. 2, 1962, 33, abstract 2G263
             ("Sb. tr. Vses. n.-i. in-t tverdykh splavov", 1960, no. 2, 90-104)

TEXT: The authors studied the effect of the cooling rate on the composition
of carburizing phases and the mechanical properties of WC carbides with 10 and
30% Co or Ni, differing by the C content. The C content varied depending on
the initial composition of the charge and sintering conditions (filling, atmos-
phere). Slowly cooled carbides with 10% Co, independent of the C content,
showed in all the experiments higher σ_{b_1} than rapidly cooled carbides. Carbides
with 30% Co showed on the contrary higher strength in rapid rather than in
slow cooling. Changes in hardness H_V of WC-Co and WC-Ni carbides cooled at
various rates, were not revealed. WC-Ni carbides are less hard and durable
than WC-Co carbides of an anologous composition. This difference is caused by
different properties of pure metals and solid solutions of their base. No

Card 1/2

On the effect of the composition ...

S/137/62/000/002/049/144
A006/A101

changes in the grain growth of the WC phase in alloys depending on the cooling rate were revealed. Data on H_v and $6\%_i$ are presented depending on the sintering conditions and the C content in the carbides.

A. Epik

[Abstracter's note: Complete translation]

Card 2/2

AUTHORS: Chaporova, I.N. and Shchetilina, Ye.A. (Moscow)

TITLE: The Limits of the Single-Phase and Two-Phase Regions
             in the Tungsten-Carbon-Cobalt and Tungsten-Carbon-
             Nickel Systems

PERIODICAL: Izvestiya Akademii nauk SSSR, Otdeleniye tekhnicheskikh
             nauk, Metallurgiya i toplivo, 1961, No.1, pp.126-132

TEXT: Results of studies of the limits of the single phase
(Co or Ni) and two-phase (Co phase + WC or Ni phase + WC) regions
are given.   Alloys were made from powders of tungsten carbide,
cobalt, nickel, and tungsten.   All the samples after pressing were
sintered at 650 to 700°C in a current of hydrogen.   The alloys
were further sintered in a laboratory vacuum furnace at temperatures
of 1400 to 1450°C.   Metallographic analysis was carried out.
Alloys in the ternary W-C-Co system containing 4 to 28 wt.% W and
0.1 to 1.72% C were studied.   Alloys containing 0.1 to 0.61% C
and 9.39 to 24.9% W were single-phased (Fig.1) with the
exception of the alloy containing 0.35% C and 19.65% W where
traces of a eutectic in the cobalt solid solution boundaries were
noted.   With increase in carbon content, the solubility of

Card 1/6

The Limits of the Single-Phase ...   S/180/61/000/001/011/015
                                          E021/E406

tungsten decreased.   Fig.2 shows the cobalt corner of the
ternary phase diagram. In the W-C-Ni system, all alloys with less
than 0.25% carbon were single-phased. . An alloy containing 0.5% C
and 14.5 or 19.5% W showed traces of a second phase. With
24.5% W crystals of WC appeared after sintering, after melting
carbon with traces of a eutectic (Ni phase + WC) along the grain
boundaries.   Fig.4 shows the phase diagram for this system.   The
solubility of tungsten bears little relation to the carbon content.
Study of the limits of the two-phase region WC + Co in the
W-C-Co system was carried with alloys containing 55, 30 and 10%
cobalt.   Alloys with 55% Co had the $\eta1$ phase present when the
carbon content calculated from tungsten carbide was less than 4.58%.
Excess carbon led to the formation of a three phase structure
(Co phase + WC + C).   Alloys containing 6.12 to 4.58% carbon (as
tungsten carbide) were two-phased (WC + Co).   Alloys with 30% Co
were two-phased when the carbon content was 5.83 to 6.12% (as
tungsten carbide).   In this system the limit at which carbon
appeared coincided with the geometric line Co-WC.   Studies of the
W-C-Ni system were carried out with alloys containing 55, 30, 15
and 10% Ni.   The carbon-rich boundary in this case was below the
Card 2/6 ·

The Limits of the Single-Phase ...   S/180/61/000/001/011/015
E021/E406

geometric line Ni-WC.   Traces of η_1 phase were detected in
samples containing 30% Ni and 5.11% C (as WC).   The alloy
containing 15% Ni had traces of η_1 phase when 5.88% C (as WC) was
present.   The boundary between the 2-phase (WC + Ni) and the
3-phase (WC + Ni + η_1) in the case of the alloy containing 10% Ni
was at a C content (as WC) of 6.04 to 6.10%.   Some magnetic
measurements were also made.   These confirmed the metallographic
analysis.   There are 4 figures, 7 tables and 5 references:
1 Soviet and 4 non-Soviet.

SUBMITTED: June 15, 1960

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The Limits of the Single-Phase ...   S/180/61/000/001/011/015
                                       E021/E406

Fig.1.   Microstructure of an alloy containing 0.15% C, 19.85% W,
remainder Co (x100).

Фиг. 1. Микроструктура сплава состава:
0.15% C, 19.85% W, остальное Co (×100)

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S/180/61/000/003/002/012
E021/E135

1.1600   also 1521,4016

AUTHORS: Chaporova, I.N., and Shchetilina, Ye.A. (Moscow)

TITLE: The process of sintering and the structure of tungsten
carbide - cobalt and tungsten carbide - nickel
alloys with a carbon deficit

PERIODICAL: Izvestiya Akademii nauk SSSR, Otdeleniye tekhnicheskikh
nauk, Metallurgiya i toplivo, 1961, No.3, pp. 37-41

TEXT: The process of sintering was studied using production
conditions for sintering, i.e. the temperature was gradually
increased up to the sintering temperature and the alloys were
subsequently cooled at different rates. Alloys with 10, 15, 30 and
40 weight % cobalt (nickel) were prepared with different deficits
of carbon. The amount of carbon was varied by additions of
tungsten. In alloys containing 40% cobalt, sintered at temperatures
below where a liquid phase appears, the η_1 phase in the form of
lakes was detected. It was found that lakes of η_1 phase can be
formed when a liquid phase appears during sintering if the quantity
of liquid is insufficient for recrystallization of the η_1 phase
through the liquid. Thus, alloys containing 30% cobalt, with a

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The process of sintering and the E021/E135

carbon content in the tungsten carbide of 5.47 weight % and less, sintered at 1400 °C, have lakes of η_1 phase, the size of which is greater than or equal to that of the tungsten carbide grains. With increasing carbon or cobalt content the η_1 phase, which formed in the solid state, can completely dissolve in the liquid and is then reprecipitated during cooling in the form of coarse crystals. Fast cooling from high temperatures above the liquidus can result in a eutectic structure.   With alloys containing 15 and 10% cobalt, lakes of η_1 phase were observed after sintering at 1450 °C with carbon contents in the tungsten carbide of 5.88 and 5.94 weight % respectively. With increase in carbon content, crystals of η_1 similar to those in the alloy containing 30% cobalt were observed. Further increase in carbon content in the 10% cobalt alloy resulted in η_1 phase in a needle shaped or dendritic form in a lace-like pattern.   With very low carbon deficit, the η_1 phase can be precipitated at the tungsten carbide - cobalt boundary in the alloys containing 10, 15 and sometimes 30% cobalt. Investigations of the tungsten - carbon - nickel alloys gave similar results. In the alloy containing 30% cobalt, a carbon content in the tungsten carbide of 5.35 weight % or less resulted Card 2/ 3

22974

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The process of sintering and the ...   E021/E135

in a fine precipitate of η_1 phase in the cementing phase.   When
the investigations were carried out in a carburizing atmosphere,
precipitate of η_1 was observed in the central region, with none
in the periphery.   Some samples were so saturated with carbon that
free graphite occurred.   With increase in temperature to 1450 °C,
grain growth of the tungsten carbide occurred.   The investigations
showed that the method of saturating alloys containing η_1 phase
with carbon used in production is fully proved and does not lead to
marked changes in the tungsten carbide grain size.
There are 2 figures (15 microphotographs) and 7 references:
3 Soviet and 4 English.   The English language references read as
follows:
Ref.1: J. Gurland. J. Metals, 1954, Febr., v. 6 No.12, Section 2,
       pp. 285-290.
Ref.2: L. Brownlee, R. Edwards, T. Raine. Powder Metallurgy, 1954,
       Group IV, p. 50 (The Iron and Steel Institute).
Ref.4: P. Rautala, J. Norton. J. Metals, 1952, Oct., v. 4, No.10,
       pp. 1045-1050.
Ref.7: J. Gurland. J. Metals, 1954, November, p. 1327.
SUBMITTED: July 9, 1960
Card 3/3

18.1152   1045

28874
S/180/61/000/004/012/020
E193/E383

AUTHORS: Rybal'chenko, R.V., Tret'yakov, V.I. and
Chaporova, I.N.

TITLE: The effect of tantalum carbide on the composition and
properties of the cobalt phase in the titanium
carbide-tungsten carbide-cobalt alloys

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Otdeleniye
tekhnicheskikh nauk. Metallurgiya i toplivo.
no. 4, 1961, pp. 83 - 89

TEXT: The effect of TaC additions on the properties of WC-
-TiC-Co and TiC-WC alloys has been frequently studied but there
are no published data on the effect of this compound on the
properties of the Co binder as present in the cemented WC-TiC
carbides; hence the present investigation whose object was to
determine the boundary of the single-phase region in the Co-rich
corner of the TiC-WC-Co and TiC-WC-TaC-Co systems, the melting
points of the eutectics formed in these systems, and microhardness
of the Co-rich solid solution at room and elevated temperatures.
In addition, the effect of excess (free) carbon on the properties
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The effect of tantalum carbide ....

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S/180/61/000/004/012/020
E195/E385

of these alloys was also studied. The experimental alloys were prepared in the following manner: three TiC-TaC-WC alloys were prepared first by adding TaC to a TiO_2 + WC + C mixture and heating the whole at 2 000 - 2 200 °C in hydrogen. The composition of these alloys is given below:

Alloy No.	Nominal composition, %		
	TiC	TaC	WC
1	28	5	67
12	28	11	61
24	22	22	56

After grinding and deoxidising, these alloys in the powder form were either sintered or melted with cobalt to form Co-TiC-TaC-WC alloys containing 10 - 99.8% Co. In some cases, excess carbon was introduced by melting the alloys in a graphite crucible. All
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S/180/61/000/004/012/020
The effect of tantalum carbide E193/E383

alloys were examined after a homogenising treatment, consisting of 24 hours at 1 250 °C, followed by furnace-cooling. The results of hardness measurements are reproduced in Figs. 3 and 4. In Fig. 3, the Vickers hardness (H_V, kg/mm^2) is plotted against the test temperature (t, °C), the various curves relating to pure cobalt (Curve 6) and Co-base solid solutions containing TiC (Curve 1), TaC (Curve 2), TiC + WC (Curves 3, 4) and TiC + WC + TaC (Curve 5). In Fig. 4, the microhardness (H_μ, kg/mm^2) is plotted against the carbide content (wt.%) in Co-base solid solutions containing TiC (Curves 1, 2), TaC (Curve 3), TiC + WC (Curves 4, 5) and TiC + WC + TaC (Curves 6, 7); broken curves relate to alloys containing excess carbon. Several conclusions were reached:
1) addition of TaC (in quantities used in the present investigation) to a TiCWC solid solution does not affect the solubility of TiCWC in Co, irrespective of whether there is a deficiency or an excess of carbon in the system. The boundary of the solid
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The effect of tantalum carbide ....

solubility range in the Co-TiC-WC system is shown by the curve
in the diagram reproduced in Fig. 1, where the concentration is
in wt.%.

2) The 2-phase Ta-bearing alloys have the melting point of the
bindary eutectic (Co-TiCWCTaC) approximately 100 ^{o}C higher than
the melting point of the corresponding eutectic in the Co-TiCWC
system. At the same time, the melting point of the ternary
eutectic (Co + TiCWCTaC + C) is only 20 - 30 ^{o}C higher than that
of the Co + TiCWC + C eutectic.

3) Room-temperature hardness of the Co-TiCWCTaC single-phase
alloys is higher than that of the corresponding Ta-free materials,
this difference persisting up to 400 ^{o}C. This means that
addition of TaC to cemented carbides should increase the high-
temperature strength of the Co binder whereby the performance of
these alloys in some applications should be improved. This,
however, applies only to alloys containing no excess (free)
carbon in the presence of which hardness of the TaC-bearing
solutions decreases, although still remaining higher than that of
TaC-free alloys. Hence the importance of a strict control of the

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S/180/61/000/004/012/020
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carbon content in commercial-grade, Ta-bearing cemented
carbides. L.Ye. Pivovarov and A.Ye. Koval'skiy participated
in this work.
There are 4 figures, 3 tables and 7 references: 2 Soviet-bloc
and 5 non-Soviet bloc. The English-language reference quoted
in the abstract is: Ref. 4 - Miller - Metal Progr., 1953, 63,
No. 4, 35.

SUBMITTED: July 22, 1960

Fig. 1:
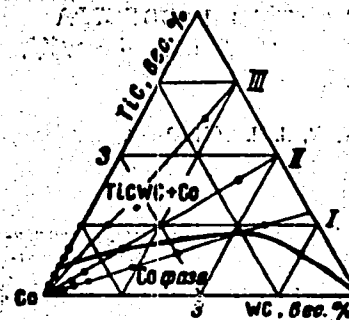
Card 5/6

15 2240

24196
S/129/61/000/007/011/016
E073/E535

AUTHORS: Chaporova, I.N., Shchetilina, Ye. A. and Serebrova, O.I.

TITLE: Influence of Additional Tempering on the Properties of
            the Carbides WC-Co

PERIODICAL: Metallovedeniye i termicheskaya obrabotka metallov,
            1961, No.7, pp.44-46

TEXT: The authors investigated the carbides ВК4В (VK4V),
ВК6В (VK6V), ВК8В (VK8V) and ВК6М (VK6M) after heat treatment.
The specimens were heated in a resistance furnace for 1.5-2 hours
at 750, 500, 250 and 150°C. The duration of soaking at the
tempering temperature was 2 hours and this was followed by cooling
at a rate of 2°C/min. From each batch specimens were taken for
investigating the microstructure, determining the coercive force,
the bending strength and for the alloy VK4V also the impact
strength. The specimens from the carbides VK8V, VK6V and VK4V
contained micrographite inclusions in addition to grains of a
tungsten carbide and veins of the cobalt phase. The alloy VK6M
had a two-phase composition. Granulometric analysis of the
carbide phase showed that during heat treatment (tempering at
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various temperatures), the size of the tungsten carbide grains did not change either in the coarse grain carbides VK8V and VK4V, the medium grain carbide VK6V or in the fine grain carbide VK6M. The shape of the grains of the WC phase also did not change. No difference was observed in the coercive force values before and after tempering. A slight increase in the bending strength (by 8 to 10 kg/mm^2) was observed after tempering at 250°C. However, tempering at 500 and 750°C did not result in any change of the bending strength. Taking into consideration the square errors of the mean arithmetic values, it can be stated that even at 250°C the influence of tempering is insignificant and is almost entirely overshadowed by fluctuations of the average strength values. Tempering of the alloy VK6V at 250 and 500°C showed no influence on the bending strength. In tests with a second batch of specimens of the same alloy, an appreciable drop in the strength was observed (by 23 and 21 kg/mm^2, respectively) for both tempering temperatures. Tests of the alloy VK4V at 750, 500, 250 and 150°C revealed in all cases a very slight tendency to a drop in the bending strength (by 6 to 13 kg/mm^2) which did not exceed

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the limits of the fluctuations of the average strength values.
No difference was observed between the impact strength values
of the carbide VK4V before and after tempering.   Tempering of
three different batches of the carbide VK6M was first carried out
at 250, 500 and 750°C. In the batch tempered at 500°C, an
appreciable increase in strength was observed, from 149 to 171 kg/mm^2.
For verifying this all the three batches were again tempered at
500°C. The strength of the specimens of both batches corresponded
to the initial state and for the third batch the strength values
differed from the average ones. The investigations have shown
that tempering of the carbides VK4V, VK6V and VK8V at 750, 500,
250 and 150°C does not produce any appreciable change in the
properties. The investigated carbides contain graphite inclusions
and, in the presence of graphite, decomposition of the Co solution
is made easier and the composition of the cementing phase in the
alloys was near to that of pure cobalt. Apparently additional
heating does not change the composition of the Co phase and,
therefore, does not have any influence on the properties of the
WC-Co alloys. The carried out experiments and the explanation of

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                                        E073/E535

the obtained results cannot be considered exhaustive,   since the
changes in the properties of the alloys can be brought about by
other factors (changes in the stress state of the alloy, phase
transformations of the Co phase etc.).   There are 1 figure,
2 tables and 3 references: 1 Soviet, 1 Austrian and 1 English:
U.S. Patent No.278073 (Method of heat treatment of carbide plates
for increasing the tool service life).

[Abstractor's Note: This is an abridged translation.]

ASSOCIATION: Vsesoyuznyy Nauchno-issledovatel'skiy institut
            tverdykh splavov (All Union Carbide Scientific
            Research Institute)

Card 4/5

15 2240

29531
S/078/61/006/011/006/013
B101/B147

AUTHORS: Rybal'chenko, R. V., Chaporova, I. N., Tret'yakov, V. I.

TITLE: Effect of carbon on the solubility of titanium carbide in cobalt, and some properties of Ti-C-Co alloys

PERIODICAL: Zhurnal neorganicheskoy khimii, v. 6, no. 11, 1961, 2517-2527

TEXT: The ternary system Ti-C-Co has not been studied as yet. The authors studied the action of C on the solubility of TiC in the system TiC-Co. The following initial substances were used: Co obtained by calcinating cobalt oxalate and reducing the oxide by H_2; TiC obtained by reduction of TiO_2 by carbon black, and Ti metal. The components were fused in a vacuum furnace. Some samples were homogenized in H_2 stream. The following alloys were synthesized: TiC-Co alloys with 0.2-10 % by weight of $TiC_{0.98}$; with 0.6, 0.8, and 1.5 % of $TiC_{0.93}$ and alloys with $TiC_{0.64}$, $TiC_{0.55}$, and $TiC_{0.50}$. Samples with C excess were obtained by

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Effect of carbon on the solubility...

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S/078/61/006/011/006/013
B101/B147

melting in graphite crucibles.   The alloys with 0.2 and 0.4 % of $TiC_{0.98}$ as well as those with 0.6 and 0.8 % of $TiC_{0.93}$ were single-phas·. Alloys with a higher TiC content showed a TiC+C eutectic at the polyhedral faces of the Co phase. Alloys molten in H_2 stream at 1350-1450°C showed decarbonization, due to which the solubility of Ti. in Co and the melting point of the alloy increased. Microstructural analyses of the samples molten in the vacuum confirmed that the solubility of TiC in Co increases due to decreasing content of C. Samples molten in graphite crucibles showed that the solubility of TiC decreased to 50 %. For alloys saturated with C and having an excess of C, the solubility of TiC was not higher than 0.2 %, With decreasing C content it increased up to 5 %. Thermal analysis (determination of solidus points by an МОП-48 (MOP-48) pyrometer) showed that with rising TiC content melting temperature decreased from 1480°C to 1360°C. Melting point of the eutectic TiC + Co was 1365°C (measured by ПП (PP) thermocouple). With decreasing C content it increased to 1440°C. X-ray analysis, performed by K. F. Kuznetsova and L. Kh. Pivovarov under supervision of A. Ye. Koval'skiy by an УРС-50 (URS-50) apparatus, showed that in pure cobalt alloys only cubic Co occurred; in cobalt alloys with 0.2-0.6 % of

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Effect of carbon on the solubility...

$TiC_{0.98}$, which also contained graphite, only hexagonal Co occurred. C-free alloys behaved differently: Up to a TiC content of 0.6 %, Co was cubic; with 1.5 % of TiC, Co was hexagonal. Microhardness determined by a ПМТ-3 (PMT-3) apparatus showed the following: For pure Co, microhardness was 250 kg/mm^2; for 0.2 % of TiC, it increased to 275 kg/mm^2, and this value did not change with further increasing TiC content. If the alloy contained graphite inclusions (Co + C eutectic), microhardness decreased to 200 kg/mm^2. In alloys containing very little C the hardness of the Co phase increased to 300 kg/mm^2 due to increased solubility of Ti in Co. Change of hardness with rising temperature of solid solutions Co + TiC measured by a ВИM-1 (VIM-1) apparatus showed a slight difference from the hardness of pure cobalt up to 300°C. At higher temperatures, pure Co is harder. It is evident that the presence of C considerably decreases the hardness of alloys. The melting point of the ternary eutectic TiC + C + Co is 1200°C. Therefore, the synthesis of TiC-Co alloys has to be performed such that rather a loss of C than enrichment by C takes place. Papers by V. N. Yeremenko (Zh. neorg. khimii, 1, 2131 (1956))

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Effect of carbon on the solubility...

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S/078/61/006/011/006/013
B101/B147

A. N. Zelikman and D. S. Bernshteyn (Tekhnologiya tsvetnykh metallov
(Technology of nonferrous metals) Sbornik trudov, GONTI, M., 1952, v. 23,
p. 48) are mentioned. There are 5 figures, 6 tables, and 10 references:
5 Soviet and 5 non-Soviet. The three most recent references to English-
language publications read as follows: Max Hansen. Constitution of
binary alloys, New York - Toronto - London, 1958; J. Cadoff, J. D. Nielsen,
J. Metals, 5(212), 248 (1953); Nishimiro Hideo, Kimuro Hirozo. J. Japan
Inst. Metals, 20, 528 (1956).

SUBMITTED: June 3, 1960

Card 4/4

15.2410
15.2240

33452

S/126/61/012/006/009/023
E193/E383

AUTHORS: Baskin, M.L., Tret'yakov, V.I. and Chaporova, I.N.

TITLE: Diffusion of niobium in titanium carbide and in the TiC-NbC solid solution of equimolecular composition

PERIODICAL: Fizika metallov i metallovedeniye, v.12, no. 6, 1961, 860 - 864

TEXT: The object of the present investigation was to obtain data on diffusion of Nb in titanium carbide and in the TiC-NbC alloy, indispensable in solving the problems arising in studies of processes taking place during the preparation of so-called complex carbides. To facilitate sintering of TiC specimens, 0.25% Ni was added to the powder mixture, the Ni binder volatilizing completely during subsequent sintering. Sintering of both TiC and TiC-NbC specimens (15 mm diameter, 5 mm thick) was carried out in vacuum in two stages: slow heating (10 °C/min) to about 1 930 °C, followed by 2.5 hours at 2 300 °C (a high sintering temperature was used to ensure that no grain growth would occur during the subsequent diffusion anneals carried out at temperatures below 2 300 °C. The properties of
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Diffusion of niobium ....

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E193/E383

sintered compacts are given in Table 2. The method employed
for determination of the diffusion coefficients, D, entailed
deposition of thin, radioactive Nb^{95} films on one side of
polished specimens, and measuring the counting rates on the
opposite side as a function of time at the test (diffusion
annealing) temperature. The results (average of four measure-
ments) for the diffusion of Nb in TiC are given in Table 3,
those for diffusion of Nb in TiC-NbC alloy being given in
Table 4. The variation of D in the former and latter cases
can be described by:

$$D = 2.4 \exp\left(-\frac{84\,000}{RT}\right), cm^2/sec \qquad (4)$$

and:

$$D = 4.7 \times 10^2 \exp\left(-\frac{120\,000}{Rt}\right) \qquad (5)$$

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Diffusion of niobium ....

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E193/E383

the two values of 84 000 and 120 000 representing the activation energies (cal/mole) for the respective processes. The results obtained showed that addition of NbC to TiC decreases considerably the rate of diffusion of Nb, which indicates that the atomic-bond forces in the TiC-NbC solid solution are higher than those in TiC. Acknowledgments are expressed to L.G. Grigorenko and N.S. Anikina, technicians. There are 3 figures, 4 tables and 7 references: 6 Soviet-bloc and 1 non-Soviet-bloc.

ASSOCIATION: Vsesoyuznyy nauchno-issledovatel'skiy institut tverdykh splavov (All-Union Scientific Research Institute of Hard Alloys)

SUBMITTED: January 24, 1961

Card 3/9 3

TRET'YAKOV, Vsevolod Ivanovich. Prinimali uchastiye: CHAPOROVA, I.N.,
kand. tekhn. nauk; KOVAL'SKIY, A.Ye., kand. khim. nauk;
BARANOV, A.I., inzh.; MEYERSON, G.A., prof., doktor tekhn.
nauk, retsenzent; IVENSEN, V.A., kand. tekhn. nauk, retsenzent;
BABICH, M.M., inzh., retsenzent; OL'KHOV, I.I., red.; MISHARINA,
K.D., red. izd-va; DOBUZHINSKAYA, L.V., tekhn. red.

[Ceramic-metal hard alloys; physicochemical principles of their
production, properties and fields of use] Metallokeramicheskie
tverdye splavy; fiziko-khimicheskie osnovy proizvodstva,
svoistva i oblasti primeneniia. Moskva, Gos.nauchno-tekhn.izd-
vo lit-ry po chernoi i tsvetnoi metallurgii, 1962.   592 p.
                                           (MIRA 15:1)
                   (Ceramic metals)

Investigation of the effect S/126/62/013/005/008/031
                                    E193/E383

carried out at 400 °C on specimens vacuum-annealed for 1 hour
at temperatures varying from 1 000 - 2 300 °C. The structure of
the fracture surfaces of specimens broken under impact at room
temperature was examined with the aid of an electron microscope,
both optical and electron microscopes being used for the examin-
ation of microstructure. The results can be summarized as
follows:
1) the mechanical properties of cast and cold-worked tungsten
were not affected by annealing at temperatures below 1 200 °C,
the average numerical values obtained being:

UTS = 62 kg/mm^2; Brinell hardness number HB = 430; elongation
δ = 17%; reduction in area Ψ = 50%.
2) After annealing at temperatures equal to or higher than
1 600 °C, the UTS of the metal studied decreased to $\sim$ 20 kg/mm^2
and its HB to $\sim$300. In contrast to the general rule, the
decrease in hardness was not accompanied by a corresponding
increase in plasticity. On the contrary, both δ and Ψ
decreased after this treatment, the former to about 3% and the
latter to about 18%.

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Investigation of the effect ....

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3) Irrespective of annealing temperature, no evidence was found of the precipitation of a second-phase at the grain boundaries of recrystallized specimens.
4) Recrystallization of tungsten was accompanied by broadening of the grain boundaries and by a gradual increase in the degree of order of the structure in the interior of the grains (this latter effect was revealed by the fact that small etching pits which were randomly oriented on deformed material formed a regular pattern on recrystallized specimens).
5) The width of grain boundaries depended on the degree of misalignment between the adjacent grains and increased with increasing annealing temperature, reaching a value of 3.5 - 4.5 μ in cast material, which can be regarded as material annealed at a temperature just below the melting point of the metal.
6) Plastic deformation caused considerable changes in the structure of the interior of the grains and promoted the formation of a specific microstructure, characterized by very narrow (0.5 - 1 μ) grain boundaries.
7) The decrease in plasticity of recrystallized tungsten was
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Investigation of the effect S/126/62/013/005/008/031
E193/E383

found to be directly related to the broadening of grain
boundaries. This was taken to indicate that the brittleness of
recrystallized tungsten and other similar metals was caused by
intergranular internal adsorption of impurities.
In view of the results obtained it would appear that there are
four possible ways of minimizing the embrittling action of
recrystallization of tungsten and other metals prone to this
effect: a) reducing the impurity content of the metal;
b) grain refinement; c) heat-treatment: d) alloying with
elements inhibiting intergranular internal adsorption and harmful
impurities. That the last of these methods may be no less
effective than the first is indicated by the results of many
investigations carried out by V.I. Arkharov and his co-workers
and by the fact that the plasticity of W and Mo can be increased
considerably by the addition of 20 - 35% rhenium in the former
and 40 - 50% rhenium in the latter case. There are 4 figures.

SUBMITTED: August 15, 1961

Card 4/4

21.2400

41520
S/126/62/014/003/011/022
E202/E492

AUTHORS: Baskin, M.L., Tret'yakov, V.I., Chaporova, I.N.

TITLE: Diffusion of tungsten in monocarbides of tungsten
             tantalum, titanium, and in solid solutions of
             TiCWC and TiCWCTaC

PERIODICAL: Fizika metallov i metallovedeniye, v.14, no.3, 1962,
             422-427

TEXT: Diffusion coefficients of tungsten (D), and activation
energies (Q), during the diffusion of W in TiC, WC, TaC and in
solid solutions comprising: 93% TiC + 7% WC; 77% TiC + 23% WC;
59% TiC + 34% WC + 7% TaC and 48% TiC + 37% WC + 15% TaC
(all % mol), were determined. A method of introducing and
anchoring on the surface of the sample radioactive tungsten was
developed. Considerable difficulties were experienced in
compacting and high temperature diffusional annealing. Chemical
composition including combined and free and the stoichiometric
C content, lattice parameter of the original constituents and
their origin were given as well as the details of the compacts.
The latter included specific gravity, lattice parameter, porosity,
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Diffusion of tungsten ..:

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E202/E492

grain size and Ni content (spectrometrically).   L. Foster's method (J. Amer. Ceramic Soc., v.33, no.1, 1950, 27) of compacting was used throughout.   D values for the diffusional annealing at 2130, 2170, 2230 and 2300°C were determined for all the above compositions and the Q and D_0 values calculated therefrom.   It was found that TiC had the lowest Q (115 $\pm$ 8 kcal/mol) while 50% TiC + 34% WC + 7% TaC had the highest (225 $\pm$ 27 kcal/mol).   Addition of TaC to the solid solution of TiCWC substantially increased Q.   Certain compositions of TiCWC and TiCWCTaC showed maximum values of Q. The presence of these maxima were explained by the energy levels and the incomplete 3d shell in titanium.   There are 4 tables.

ASSOCIATION: Vsesoyuznyy nauchno-issledovatel'skiy institut
            tverdykh splavov (All Union Scientific Research
            Institute of Hard Alloys)

SUBMITTED: December 26, 1961

Card 2/2

BASKIN, M.L.; TRET'YAKOV, V.I.; CHAPOROVA, I.N.; Prinimali uchastiye:
    ANIKINA, N.S.; GRIGORENKO, L.G.; CHEREDINOV, A.A.

Diffusion of tungsten in monocarbides of tungsten, tantalum,
and in TiCWC and TiCWCTaC solid solutions. Fiz. met. i
metalloved. 14 no.3:422-427 S '62.   (MIRA 15:9)

1. Vsesoyuznyy nauchno-issledovatel'skiy institut tverdykh
splavov.

                    (Tungsten) (Diffusion)

BASKIN, M.L.; TRET'YAKOV, V.I.; CHAPOROVA, I.N.

Niobium diffusion in titanium carbide in a solid solution of TiC-NbC of equimolar composition. Fiz. met. i metalloved. 12 no.6:
860-864 D '61.

(MIRA 16:11)

1. Vsesoyuznyy nauchno-issledovatel'skiy institut tverdykh splavov.

L 25275-65   EWG(j)/EWP(e)/EWT(m)/EPF(c)/EWA(d)/EPR/EWP(t)/EWP(b)   Pr-4/Ps-4
IJP(c)   MJW/JD/WW/JG/WH
ACCESSION NR: AR4048251   S/0137/64/000/009/I086/I086

SOURCE: Ref. zh. Metallurgiya, Abs. 9I556

AUTHOR: Rybal'chenko, R. V.; Tret'yakov, V. I.; Chaporova, I. N.

TITLE: The effect of structurally free carbon on certain
physicomechanical and performance properties of titanium-tungsten
hard alloys

CITED SOURCE: Sb. tr. Vses. n.-i. in-t tverdy#kh splavov, no. 5,
1964, 173-181

TOPIC TAGS: titanium base alloy, tungsten containing alloy, metal
physical property, metal mechanical property, carbon/ alloy T5K10,
alloy T15K6, alloy T30K4

TRANSLATION: The following methods were used in investigating the
alloys: chemical, metallographic, determination of specific weight,
sigma_bu at room temperature and at 800°, resistance to wear during
cutting, electrical conductivity, and measurement of R_A and H_c. When
sintering T5K10, T15K6 and T30K4 alloys in carbonized packing (pure

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ACCESSION NR: AR4048251

korraks, korraks +0.05% carbon, graphitic sandstone, graphitic
sandstone with carbon black, and lamp black) the amount of bound
carbon does not change. The amount of free carbon increases gradually
up to the saturation point of the cobalt phase at sintering tempera-
ture. In the presence of structurally free carbon (graphite) in the
alloys investigated, $sigma_{bu}$, in comparison to samples sintered in
korraks and which do not contain graphite, increases to 20-25 kg/mm^2
at 20°, while at 800° the same samples have the lowest value of
$sigma_{bu}$. The wear resistance of T15K6 and T5K10 alloys during steel
cutting decreases with an increase in the level of free carbon, while
for alloy T30K4 it is almost unchanged.

SUB CODE: MM   ENCL: 00

Card 2/2

L 40056-66   EWT(m)/EWP(t)/ETI   IJP(c)   WH/JW/JD

ACC NR: AP6025942   SOURCE CODE: UR/0226/66/000/007/0076/0083

AUTHOR: Chaporova, I. N.; Rybal'chenko, R. V.; Vrzheshch, Ye. Ya.

ORG: All-Union Scientific Research Institute of Hard Alloys (Vsesoyuznyy nauchno-
issledovatel'skiy institut tverdykh splavov)

TITLE: Synthesis and properties of (Ti, W, Cr)C carbides

SOURCE: Poroshkovaya metallurgiya, no. 7, 1966, 76-83

TOPIC TAGS: sintered carbide, titanium carbide, tungsten carbide, chromium carbide,
carbide structure, carbide property

ABSTRACT: The effect of adding up to 25% Cr_3C_2 on the properties of (Ti, W)C carbide
with a constant TiC:WC ratio of 35:65, was investigated. The initial (Ti, W, Cr)C
carbides were synthesized from TiO_2 + WC + Cr_2O_3 + C powders in hydrogen at tempera-
tures from 2573 K for pure TiO_2 + WC to 1923 K for carbide with 25% Cr_3C_2. The car-
bide powders were compacted and sintered in vacuum at 2073—2123 K. The porosity of
sintered compacts did not exceed 0.2%. An x-ray diffraction analysis revealed that
all the alloys have a solid-solution structure with an fcc lattice. With increasing
Cr_3C_2 content oxidation resistance sharply increased. The respective weight loss of
(TiW)C carbide and carbide containing 20% Cr_3C_2 was 72 and 3.6% of the original
weight in 10 hr at 1270 K. At 20% Cr_3C_2 the resistivity increased by 60%, Young's
modulus dropped from 37 to 33 $n/m^2 \cdot 10^{10}$. With increasing temperature from

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